

IOWA STATE UNIVERSITY

Digital Repository

World Languages and Cultures Publications

World Languages and Cultures

Spring 2011

Cervantes's Theory of Relativity in Don Quixote

Chad M. Gasta

Iowa State University, gasta@iastate.edu

Follow this and additional works at: http://lib.dr.iastate.edu/language_pubs



Part of the [Spanish Literature Commons](#)

The complete bibliographic information for this item can be found at http://lib.dr.iastate.edu/language_pubs/12. For information on how to cite this item, please visit <http://lib.dr.iastate.edu/howtocite.html>.

This Article is brought to you for free and open access by the World Languages and Cultures at Iowa State University Digital Repository. It has been accepted for inclusion in World Languages and Cultures Publications by an authorized administrator of Iowa State University Digital Repository. For more information, please contact digirep@iastate.edu.

Cervantes's Theory of Relativity in Don Quixote

Abstract

Este artículo muestra cómo el principio de relatividad era ya conocido y estudiado en el Siglo de Oro y cómo Cervantes estaba suficientemente familiarizado con el concepto como así lo demuestran las referencias al mismo en *Don Quijote*. La percepción inconsistente del tiempo en la cueva de Montesinos, la distancia recorrida en el Barco Encantado y la velocidad en el vuelo a lomos de Clavileño comparten una interesante peculiaridad: dichas aventuras hacen referencia al principio de la relatividad ya examinado por Nicolás Copérnico en el siglo XVI, estudiado por Galileo Galilei y Johannes Kepler a principios del XVII, y finalmente confirmado con exactitud científica por Albert Einstein. En las aventuras analizadas en este estudio, las percepciones de Don Quijote y Sancho del tiempo, el espacio y la velocidad son bastante imprecisas y a menudo disparatadas a pesar de que ambos las viven simultáneamente. Todo ello provoca discrepancias en cuanto a quién vio qué, dónde y cuándo se vio y cuál fue la duración de la experiencia. El principio de la relatividad explicaría por tanto las diferentes versiones de un mismo hecho así como la acertada interpretación cervantina de la mutabilidad y la maleabilidad del espacio, la velocidad y el tiempo.

Disciplines

Spanish Literature

Comments

This article is from *Cervantes: Bulletin of the Cervantes Society of America* 31 (2011): 51–82. Posted with permission.

Cervantes's Theory of Relativity in *Don Quixote*

CHAD M. GASTA

People like us, who believe in physics, know that the distinction between past, present, and future is only a stubbornly persistent illusion.

ALBERT EINSTEIN

DURING THE SPACE RACE between the United States and the Soviet Union, the Clavileño episode of *Don Quixote* was used to highlight the new and strange realization that man was capable of breaking his earthly bonds and hurling himself at great speeds across immense distances. In 1962, Luis Cavanillas Ávila published “Don Quijote y Sancho: Los primeros ‘cosmonautas’ del mundo” where he compared Sancho’s description of events from his flight on Clavileño to the first testimony the world received from Russian Cosmonaut Yuri Gagarin upon returning from his orbit of earth: “Que el despegue de la tierra para ascender al cosmos hay que realizarlo mediante un cohete, era ya cosa que nos había dicho Cervantes al hablarnos del Clavileño” (88). Cavanillas Ávila also quoted Luis Méndez Domínguez’s transmission from Washington, D.C. to Spain that reported Gagarin’s “fabuloso viaje,” which is surprisingly similar to Don Quixote’s in the Cave of Montesinos:

El cielo era negro y no azul. Un ciclo entero de las veinticuatro horas en tierra fue cumplido por este mozo en noventa minutos escasos. Sol, luna y estrellas desfilaron en tres cuartos de hora. No parpadeaban las estrellas, que jamás desaparecen en realidad como si

se tratara de telón de teatro simulando inmutable cielo. Amanecer y puesta de sol cada noventa minutos: vistos a través de una doble densidad atmosférica y reflejada en colores insospechados. Ni verano ni invierno para Gagarin dentro de su nave. Ni alternaciones de temperatura, ni lluvias, ni tormentas, como el hombre conoce. (89)

Gagarin's experience and observations were, of course, based on several scientific principles of physics that accounted for the spaceship's velocity in orbit and its remoteness from earth, which afforded the distant vantage point to view the changes imposed on the planet. It nonetheless has an interesting parallel with the knight's testimony in the cave where he claims that time passed with such speed that there seems to be no need to eat or use the bathroom.

Time in *Don Quixote* is fleeting and illusory. Both the narrative sequence of events and the psychological time frame of the protagonists are often inordinate and anachronic throughout the work. The novel's flow of time, for example, is constantly interrupted through a variety of techniques including deliberate pauses, asides, interpolated stories, the intrusion of multiple narrative voices, or even intentionally, well-placed ambiguity about times and dates. Hence, *Don Quixote* is built around a confusing narrative arrangement that places emphasis on characterization and plot over chronology. This may well have been part of Cervantes's plan, as Edward H. Friedman reminds us:

It appears that Cervantes sought to make the temporal scheme a point of contention in *Don Quixote*. Not only are the narrators vague about when the action takes place, but references to time are often contradictory. The annals of La Mancha and the recollections of informants would seem to place the events in a somewhat distant past, but the allusions to contemporary literature and theater (including Cervantes's own *Galatea*, of 1585, for example) cast the narrative in the present. (132)

The scholarly debate regarding chronologically acceptable time refers to the events that purportedly have taken place in the ten-year

period between the publication of part one in 1605 and part two in 1615. According to numerous textual references, Don Quixote's initial adventures begin in July, the second sally probably in August, and, as the first part comes to a close, it is late summer and the knight is home resting. This seems reasonable. However, part two transpires during spring and early summer of the following year, even though the narrator informs us at the beginning that just less than thirty days have passed since Don Quixote returned home in part one. Even more confusing is the fact that, as part two commences, the knight hastily departs his village so that he may be present at the jousts in Zaragoza in March, a lengthy seven months later. He never makes it there, of course, not least of all because the impromptu publication of Avellaneda's spurious second part compelled Cervantes to set his protagonist on a different geographic path leading to Barcelona. Nonetheless, in Cervantes's text, fall and winter have vanished from Don Quixote's calendar. Such broad disregard for clock-like or calendar-like chronology should really not surprise us since the novel is chiefly concerned with imitating and, to a great extent, parodying the supposedly historical-like chivalric romances. What better way to achieve this goal than to mock their misguided attempts at historical verisimilitude?

Over the past century critics have attempted to remedy temporal inconsistencies by fixing the chronological order of the novel's episodes to the external measures of a calendar and devise a credible timeline that illustrates when the knight departed, how long he was gone, and when he returned.¹ To be sure, textual references accurately establish dates and even the exact hours for some of the protagonists' journey—although somewhat randomly and not in all cases. Hence, any attempt to order time logically has only failed. Indeed, in *The Golden Dial* L.A. Murillo dismissed the notion that a precise chronology could be applied to *Don Quixote*, concluding that the novel's episodes cannot and should not be set to an annual calendar (24-25). Instead, Murillo smartly opted to differentiate between a time of myth—the anachronic narrative time of the novel—and a time of history which is measured

1 For example, see Dale; Gómez Galán; Ibérico Rodríguez; and Rueda Contreras.

by the calendar. He also asserted that part one occurs in historical time and part two in mythical or literary time. Moreover, Murillo found that part two relies more heavily on time's temporality and disorder in the narrative's external episodic sequencing which empowers a similar internal temporal disarray in the protagonists' sense and measurement of time, space and motion. As a result, the notion of time, space, and motion is so imprecise in part two that Sancho and Don Quixote often claim relative and uniquely disparate experiences regarding events they both perceive, especially in the three episodes studied here: the Cave of Montesinos, the Enchanted Boat, and the flight aboard Clavileño.

In these adventures, Don Quixote and Sancho's movement through space and time is relative to each character's perception of the unfolding events, setting up confrontations regarding who saw what; when and where it was witnessed; and how long it occurred. In particular, the unstable perception of time in the Cave of Montesinos, of distance in the Enchanted Boat, and of motion in the flight aboard Clavileño, all share an interesting peculiarity: these adventures reference pervasive early modern views regarding the principle of relativity that was examined by Nicolas Copernicus in the mid-sixteenth century, studied by Galileo Galilei and Johannes Kepler in the early seventeenth, and finally confirmed scientifically by Albert Einstein.

In no way do I wish to suggest that Cervantes's novel can be considered a precursor to Einstein's *Theory of General Relativity* (1916), though it is quite tempting to think he took inspiration from Cervantes, given that *Don Quixote* was his second favorite book.² Instead, this essay shows that relativity was largely known and studied in early modern Spain, and that Cervantes was familiar with the scientific premise. Early notions of relativity likewise validate Don Quixote and Sancho's

2 According to Gerhard Sonnert, "When C.P. Snow (1979) visited Einstein in the summer of 1937, he found that Einstein's favorite novel was *The Brothers Karamazov* and his second-favorite novel *Don Quixote*" (46). In a 1966 *New York Review of Books* essay "Einstein," Philippe Halsmans wrote that Einstein used to spend his evenings reading *Don Quixote*, one of his "favorite classics," aloud to his sister, his daughter Margot, and his secretary, which took months to finish. Likewise, Einstein, along with his friends Maurice Solovine (1875-1958) and Konrad Habicht (1876-1958), under the name "Olympia Academy," included *Don Quixote* in their daily discussions on literature and philosophy (Damour 153).

contrary observations in each of the aforementioned episodes, and demonstrate Cervantes's canny interpretation of the mutability and malleability of space, motion, and time.

To this end, a review of Einstein's conclusions is required in order to corroborate prior scientific advancements. Einstein's two well-known theories—the *Theory of Special Relativity* (1905) and the *Theory of General Relativity* (1915)—were built upon earlier efforts by Copernicus, Galileo (who coined the term “relativity”), Kepler and Newton. Both of Einstein's theories explain the relationship between time, space, and speed when moving along a straight path at a constant speed. Famously, Einstein stated unequivocally that the only fixed, absolute construct that exists in the universe is the speed of light at 186,282 miles per second. Anything else is simply temporal. The more comprehensive of the two theories, the *Theory of General Relativity*, extended this theory to *all* motion, accelerated or not. Einstein correctly assumed that if the speed of light is constant, a major construct in our lives—time—must be relative to it. Moreover, we move through time just as we move through space, meaning that space, time, and motion are intimately connected (Einstein called this the “space-time continuum”). Hence, *General Relativity* unifies motion, time, and space into one construct, and demonstrates how their perception is always relative to each observer even when numerous witnesses are viewing the same thing at the same time. Just as beauty is in the eye of the beholder, Einstein proved that time, space, and motion are too. My time is not your time, my perception of speed or distance is different from yours—each is relative to the others separately and distinctly, although we may believe we are experiencing the same phenomenon.

For Einstein, time is a form of measurement with two frames of reference. The first is a subjective or psychological time bound up in how one experiences time internally. The second is an external or objectively accepted frame of reference measured by clocks and other man-made devices that are customarily used to understand the internalization of time (Moring 157). Both characterizations are relative in that, although clocks provide a conventional measure of one's psychological time, they are still arbitrary, standardized measures used to conveniently interact

with our world. Individuals nonetheless live that experience differently: for any two or more observers some days or journeys feel longer while others seem shorter, and the speed at which we move through space is indiscernible as well. Indeed, in everyday life, humans are unable to detect such differences because we are moving too slowly to be aware of them. Stephen Hawking explained as follows:

The time taken is the distance the light has traveled—which the observers do not agree on—divided by the speed of light, which they do agree on. In other words, the theory of relativity put an end to the idea of absolute time! It appeared that each observer must have his own measure of time, as recorded by a clock carried with him, and that identical clocks carried by different observers would not necessarily agree. (qtd. in Langone 20-21)

No matter the speed, the distance, or the time, each clock will be different depending on the observer's position relative to the events taking place. Einstein, looking back at Galileo's many experiments with relative motion, realized that relativity was at work in everything we do. In one famous example, Galileo demonstrated that for passengers on a ship, a ball dropped from the crow's nest seems to fall straight to the deck as the falling object keeps pace with the forward momentum of the ship. However, for observers on the shore (or any fixed point in relation to the moving ship), the ball seems to fall along a curve away from the crow's nest toward the back of the ship (yet still ends up directly below the point on the ship from which it was dropped). Passengers on a different ship traveling at a slower or faster speed would see a variation of the other two observations. In other words, three parties witnessing the same actions can perceive wildly different outcomes.

Attempts to understand such differences have been made for centuries, especially by Plato, but it took Einstein to synthesize these various attempts. In the ancient world, in the "Allegory of the Cave," Plato proposed that one's individual experience of reality is unique from another's. The philosopher believed time to be transitory and the forms that make up reality's physical objects are likewise transient and

ephemeral. In Cervantes's novel, we can point to the varying views on Mambrino's helmet, the discrepancy over Sancho's salary or his length of employment (two months according to Don Quixote, two years according to Sancho, or two centuries according to Teresa Panza), the number of lashes Sancho is to have completed, or even the episode of the windmills as examples of the pliability or uncertainty of truth. In part, scholars have explained such differing points of view and diverse experiences as an element of Cervantes's exploitation of Renaissance perspectivism. In the field of art, perspectivism taught that the point of view from which artists view an image defines how they end up painting it. Such advancements affected the field of literature. In *El pensamiento de Cervantes*, Américo Castro suggests that Cervantes's conception of reality (*ser* versus *parecer*) in *Don Quixote* is inherently problematic and should be approached keeping in mind the author's unique form of perspectivism. Similarly, the socio-linguist Leo Spitzer acknowledged that a "linguistic perspectivism" anchors the novel such that a host of neologisms like the famous "baciuelmo" support equally valid but opposing views of the same object. These studies have been followed by research devoted to narrative point-of-view perspectivism: Manuel Durán discusses perspectivism as an expression of ambiguity and multiplication of narrative points of view (145); for E. C. Riley *Don Quixote* is marked by multiple versions of the same events; Juan Bautista Avalle-Arce asserts that truth depends on point of view (9); John J. Allen declares that the novel is "an exploration of the fertile possibilities in the management and manipulation of point of view" (130); and James A. Parr counts as many as eleven different narrative voices in the novel, all providing their own divergent views. Hence, often readers have no way of knowing at all what has really occurred. Moreover, Cervantes jokes about the interpretive pliability. Indeed, when Don Álvaro de Tarfe appears before the town mayor to proclaim that he does not know the false Don Quixote (from Avellaneda's spurious part two), the man's reply perhaps accurately sums up the novel's imprecision and multiperspectivism: "Eso haré yo de muy buena gana [...] y vuelvo a decir y me afirmo que no he visto lo que he visto, ni ha pasado

por mí lo que ha pasado” (2.72:500). In the end, it seems that everything is relative.

In early modern Spain, relativity was as much a scientific idea as it was both a lived phenomenon and literary topic. Sixteenth-century Spain erroneously has come to be associated with a complete deficiency in scientific advancement.³ As demonstrated time and again in recent publications such as José Manuel Sánchez Ron’s *La ciencia y EL QUIJOTE*, the University of Salamanca’s collaborative *La ciencia y la técnica en la época de Cervantes*, and Luis E. Rodríguez-San Pedro Bezares and José Luis Sánchez Lora’s *Historia de España, 3^{er} Milenio*, early modern Spain boasted a dynamic and progressive scientific setting, and was not just a bastion of Counter-Reformation ideology that choked off the modern sciences. Philip II’s monarchy—which encompassed most of Cervantes’s lifetime—was actually a fruitful epoch for the progress of physics, astronomy, biology, technology, mathematics, medicine, and pharmacology; in many ways, it was more scientifically productive than either the preceding or subsequent centuries (Sánchez Ron 10). In fact, many of the scientific advancements made across Europe during the time found a home both in Spain and in Cervantes’s novel (Sánchez Ron 10). We need only think of the technology in *Don Quixote* that reveals Cervantes’s extensive knowledge of existing developments such as windmills, fulling mills, modes of transport, a complex system of roadways, home remedies and other medicines, allusions to astronomy and maritime navigation, printing, modern warfare, and construction. In recent years, several scholars have delineated these advancements: Carroll Johnson writes about the technological and material wonders contained in *Don Quixote*; Julia Domínguez describes Cervantes’s incredibly sophisticated grasp of sea navigation, nautical tools, and cosmography; Simone Pinet discusses conceptions of space; and the recent volumes mentioned above (i.e., those of Sánchez Ron, etc.) contain essays on geography, cosmography, mathematics, natural history, medicine, psychology, and metallurgy. And while no historical documentation exists to fully appreciate Cervantes’s participation in

3 Henry Kamen deconstructs myths regarding Spain’s perceived lack of social and technological development.

the intellectual circles of his day where discoveries and advancements were paramount, these areas of study pervade his fiction. Cervantes derived some knowledge from his personal experiences traveling the peninsula and the Mediterranean, as well as from his frequent sojourns in those Spanish cities where the greatest progress in the sciences was taking place: Madrid, Seville, Valladolid, and Alcalá de Henares.⁴

Sixteenth-century Spanish knowledge about relativity was derived from the study of mathematics and astronomy shaped by Copernicus's *On the Revolutions of the Heavenly Spheres* (1543). The *Revolutions* is one of the most significant scientific publications of early modern Europe and widely viewed as a precursor to the scientific revolution initiated seventy years later by Galileo. As is well known, Copernicus proclaimed a heliocentric universe. More important to this study was Copernicus's brilliant theory that the time lapse and speed of the orbits was relative to the observer on earth; an idea that was counterintuitive to his contemporaries. In particular, Copernicus showed that some planets appeared to move faster while others seemed to traverse the universe at a much slower pace because their distance remained relative to his viewing point on earth. In other words, time and motion in space was understood in relation to the earth's position in the universe, just as measuring speed across a field depended on the position of the observer. Distance (space) and motion (speed) were resolutely connected in the Copernican system, and his theory laid the foundation for some of Galileo's work (not to mention those who came after him).

Prior to 1616, Spain had been more receptive of Copernican theory than other European countries (Castellano; Rodríguez-San Pedro and Sánchez Lora 187-91). It is hard to say, of course, what Cervantes may have known about Copernicus's work, since no direct reference to Copernicus exists in any of Cervantes's writings. But, Copernicus's views on astrology were so pervasive in Spain that it is hard to believe

4 Manuel Esteban Piñeiro believes that Cervantes attended lectures at Madrid's *Academia Real de Matemáticas*. This academy was launched by Philip II in 1582; it specialized in research on cosmography and navigation in the education and training of engineers (34-35; Sánchez Ron 10); and it was staffed by Spain's most important scientists (Flórez Miguel 59). Nothing in the historical record supports Piñeiro's assertion, however.

that Cervantes did not know something about them. Moreover, in 1561 the *Revolutions* was optional reading at the University of Salamanca (Rodríguez-San Pedro and Sánchez Lora 190-91) and was required by 1594 (Flórez Miguel 58). Salamanca was furthermore the first and only Spanish university at the time to have a “cátedra de Astrología,” which was among the most important at the institution (Flórez Miguel 58). In *Don Quixote*, Cervantes notes the significance of astrology at Salamanca: readers are told that Grisóstomo, “estudiante muchos años en Salamanca,” “sabía la ciencia de las estrellas, y de lo que pasan, allá en el cielo, el sol y la luna; porque puntualmente nos decía el cris del sol y la luna” (1.12:176). Regarding astrology more generally, the knight reminds Sancho that a knight-errant “ha de ser astrólogo, para conocer por las estrellas cuántas horas son pasadas de la noche, y en qué parte y en qué clima del mundo se halla; ha de saber las matemáticas, porque a cada paso se le ofrecerá tener necesidad de ellas” (2.18:368) and Sansón and his servant “fueron razonando los dos, hasta que llegaron a un pueblo donde fue ventura hallar un algebrista” (2.15:361). Beyond Salamanca, the *Revolutions* was widely read in its entirety in educated circles and also provided understanding of how astrology served as the basis of social belief.

After Copernicus’s death, Erasmus Rheingold, a professor at Wittenberg, adapted Copernicus’s tabulations into celestial charts called *The Prutenic Tables*. The *Tables* formed the mathematical basis for Pope Gregory XIII’s 1582 calendar revolution when the Julian calendar dropped 10 days and added a leap year so that Easter would once again fall accurately on the date the First Council of Nicaea had agreed upon in 325. The calculations for the new Gregorian calendar, as it came to be known, was based wholly on Copernicus work, and the calendar’s adoption—first by Spain and Portugal—was a major Church initiative across Europe. As Frederick De Armas reminds us, Cervantes was affected personally by these transformations. As a captive in Algiers, he was forced to adopt the Islamic lunar calendar, then returned to the Julian calendar after being freed from captivity in 1580, only to have time disrupted again when the Gregorian calendar was instituted two years later (4). Was it, perhaps, this sort of irregularity that caused the

novelist to be so blatantly, but strategically, careless with time in *Don Quixote*?

By the time the *Revolutions* was placed on the Church's index of prohibited works (in Italy in 1616, but not in Spain or Portugal), Copernicus's heliocentric theory and early views on relativity found supporters across Europe, especially Galileo. In addition to Galileo's advancement of the refracting telescope, his eventual support of Copernicus's heliocentric universe in *The Dialogue on the Two Chief Systems of the World* (1632) was the culmination of decades of research. Galileo experimented with the speed of objects by using his telescope paired with a "micrometer" (a graduated ruler that projected from the telescope's tube) to measure the distance between Jupiter and its moons (called the Medicean stars) relative to his own viewing position on Earth. His objective was to determine the mathematical values governing accelerated motion and, as a result, he proposed a "uniform accelerated motion" principle whereby falling objects increase speed at a uniform rate regardless of their individual weights (in opposition to Aristotle). With these observations, Galileo realized that the distance and speed between two objects, and the time required to cross that space, was relative to his observing position on Earth. This eventually helped him demonstrate that the Earth was not stationary but orbiting the sun. Hence, just as Copernicus linked time and space together, Galileo established, for the first time, a definitive relationship between time, space, and motion, the cornerstone for understanding relativity.

These preliminary findings were first published in *Sidereus nuncius* (*Starry Messenger*) in March 1610 in Venice. Galileo never overtly asserted the primacy of a heliocentric universe in *Starry Messenger*, but his arguments regarding the Medicean stars, the existence of sunspots and, especially, Venus's altering light all supported the Copernican system, thereby placing him at odds with Aristotelian doctrine. Considered among the most significant astronomical texts in history, Galileo dedicated his best-seller to his patron Cosimo de Medici, fourth grand duke of Tuscany, and even named the Medicean stars after Cosimo's family. This act both endeared the text to the powerful clan and ensured that it would be distributed throughout Europe via the Medici's diplomatic

channels. Indeed, Galileo sent *Starry Messenger* packaged with a telescope to each of the heads of state in Spain, France, Austria, Poland and Urbino, presenting them as if they were gifts from the Medici (Biagioli 45; Shea 51).⁵ Further development of these theories, as well as the proclamation of heliocentrism, became the subject of Galileo's *The Dialogue on the Two Chief Systems*, already in progress as early as 1609.

When Cervantes published his second part of *Don Quixote*, Galileo's *Starry Messenger* had helped ignite debate across Europe regarding heliocentrism and the relative movement of the stars and planets vis-à-vis the earth.⁶ Such debate was acknowledged in Spain. Galileo's findings were discussed in the Jesuit *Colegio Imperial de Madrid* and the *Academia Real de Matemáticas*, since the missionary group was among the first to validate Galileo's claims and then congratulate him when he was invited by Cardinal Maffeo Barberini (the future Pope Urban VIII) to present his findings at the Pontifical College of Rome in 1611. Like many others, the Jesuits would eventually condemn Galileo's remarks regarding heliocentrism—but not until 1616 when the first Inquisitorial process against the scientist got underway. It is unclear how familiar Cervantes was with Galileo's writings. No doubt Cervantes knew of the scientist and mathematician either because the Inquisition's notorious case against Galileo had become known outside Italy by 1614 or because of the scientist's several formal contacts with the Spanish court.⁷ Moreover, by 1620 *Starry Messenger* was routinely

5 I have been unable to determine the Spanish recipient. Mario Biagioli states in passing that a certain "Philip IV" (46) received one just after the publication of *Starry Messenger*, which could refer to the future Spanish king Philip IV. According to James Reston, in 1629 Philip IV "was pursuing Galileo to provide him with one of his best telescopes at any price that Galileo would name," which the latter provided much later, in 1630 (221).

6 William R. Shea documents several commentaries from European dignitaries in the months after Galileo's text was first published, which indicate not only its immediate popularity but also its widespread dispersion.

7 In response to the Spanish monarchy's ongoing contest to solve the problem of longitudinal measurement, Galileo submitted a formal proposal in 1612 (Navarro Brotons, "Galileo" 811; Machina 52). Using research from *Starry Messenger*, Galileo hoped to persuade the Spanish crown to adopt his new longitudinal system, and he even offered to travel to Spain to train officers in the new methods (Sharrat 133; Navarro Brotons, "Galileo" 811-12). The monarchy responded that a Spanish mathematician had proposed a similar solution that needed to be studied before Galileo's could be taken up, but no such proposal was ever adopted (Navarro

consulted by cosmographers in Seville and was a prominent text taught by cosmographers and professors at the *Casa de Contratación* (Navarro Brotons 814). Surely such an intersection of significant historical and scientific events, which caused pervasive commotion across Europe, as well as the singing of Galileo's praises in poetry and literature, was not lost on Cervantes. Perhaps more than any writer of his generation, Cervantes was adept at integrating the latest developments into this literary works. Certainly, Cervantes's public did *not* comprehend relativity as a mathematical equation that could explain the suspension of time or the travel through space or time—the eventual theoretical results of Einstein's work. Instead, relativity was more readily grasped as the differing perceptions of time, motion, and distance that emerged from debates regarding the makeup and design of the universe, notions that are revealed in Cervantes's novel.

Time, the most commonly experienced constituent of relativity, is explored in the Cave of Montesinos episode, an adventure that gives Cervantes a unique opportunity to examine the paradoxes of literary time ("the time of myth" for Murillo) and its links to "real," lived time (Murillo's "time of history"). From the beginning, the narrator is continuously vague or misleading about chronology, making time confusing and anachronic. Moreover, the protagonists provide similarly puzzling information, yielding a variety of contrary but reasonable perspectives. The narrator first informs us that Don Quixote, Sancho, and the Primo arrive at the cave "a las dos de la tarde" (2.22:380). Shortly after, the knight is lowered into the cavern while Sancho and the Primo "se detuvieron como media hora" (2.22:381), waiting for news. Hearing none, they haul up the limp rope until "Finalmente, a las diez, vieron distintamente a don Quijote" (2.22:380). Strangely, the narrator continues the account in the next chapter with an extraordinarily anachronic temporal leap: "Las cuatro de la tarde serían cuando el sol, entre nubes cubierto, con luz escasa y templados rayos dio lugar a don Quijote para que, sin calor y pesadumbre, contase a sus dos clarísimos oyentes lo que en la cueva de Montesinos había visto" (2.23:381). Throughout

Brotons, "Galileo" 812). Nonetheless, Galileo renewed his petition to the Spanish Crown in 1616, 1620, and 1630 without success.

this episode, the narrator is purposefully unclear about the time of action (“*como media hora*,” “*las cuatro de la tarde serían*”), indicating the unimportance of keeping time (Sieber 270). He is similarly uninterested in maintaining proper chronology: does the 4 p.m. hour specify the same day or the next? If he refers to the same day, how could Don Quixote’s story begin if he is not to surface until 10 p.m. later that night? Or, does “*a las diez*” refer to the next morning? If the narrator is indicating the following day, what happened to the intervening time? Could the narrator be so confused as to mix up night and day? Was Don Quixote in the cave overnight after all?

These, however, are not the only chronological inconsistencies in this episode. As Harry Sieber shows, the entire episode is grounded by temporal references in order to establish “the *illusion* of a linear clock-time of history” (270; my emphasis). Indeed, as the adventure unfolds, none of the protagonists agrees on how long Don Quixote was in the cave, or whether his time below sufficed for his elaborate and illusive depiction of events. This is what the Primo seems to imply:

A esta sazón dijo el primo:

—Yo no sé, señor don Quijote, cómo vuestra merced en tan poco espacio de tiempo como ha que está allá bajo, haya visto tantas cosas y hablado y respondido tanto.

—¿Cuánto ha que bajé? —preguntó don Quijote.

—Poco más de una hora —respondió Sancho.

—Eso no puede ser —replicó don Quijote—, porque allá me anochejó y amaneció, y tornó a anochecer y amanecer tres veces; de modo que, a mi cuenta, tres días he estado en aquellas partes remotas y escondidas a la vista nuestra. (2.23:382)

For Sancho and the Primo a little more than an hour has passed (versus the narrator’s “*como media hora*”) while the knight claims three days have gone by. Shortly thereafter, the knight again affirms that he spent three full days below: “*a lo menos, en estos tres días que yo he estado con ellos, ninguno ha pegado el ojo, ni yo tampoco*” (2.23:383). It should be noted that initially there is no disagreement over what

Don Quixote purports to have witnessed. The only discrepancy involves the amount of time in which he claims to have experienced it all, which later becomes the main point of contention when Don Quixote attempts to confirm his version of the events.⁸ While the knight descended into the cave, time seems to have stood still. The supposedly omniscient narrator has already provided confusing information in advance of Don Quixote's testimony, and the knight, Sancho, and the Primo are equally in disagreement about the length of time involved in the adventure, even though Sancho and the Primo are described as "clarísimos oyentes" (2.23:381). Sancho finally provides a plausible explanation for the three viewpoints:

—Verdad debe de decir mi señor —dijo Sancho—; que como todas las cosas que le han sucedido son por encantamento, *quizá lo que a nosotros nos parece un hora, debe de parecer allá tres días con sus noches*.

—Así será —respondió don Quijote. (2.23:383; my emphasis)

In the absence of corroborating stories, how is one to evaluate the testimony of any single eyewitness? As Américo Castro observes, throughout the novel reality is relative to the person experiencing it (*Hacia* 439). For Sancho and the Primo, Don Quixote's absence signified inaction, empty moments, and boredom; as a result, their experience feels inordinately long, even though they state that just over an hour has passed. For Don Quixote his dream-like experience was filled with stories of Durandarte, an appearance by Dulcinea, and a fantastic metaphysical world, making his sojourn feel like three days. In short, the disagreement over how much time has passed depends on how each party spent the time, not unlike how "time flies" for some while "time drags" for others.

Peter G. Earle writes that the pair's testimonies were correct as described: "In the knight's and the squire's fictional realm neither testimony need be denied. Each experience has been lived as described. The

8 I am referring to Maese Pedro's monkey (2.35:413-16) and the Enchanted Head (2.62:477-82).

author was fully aware that physical and mental times do not necessarily coincide" (4). At the episode's center is the irregular perception of time. The problem with our comprehension of time is that we intuitively want things to be easily understandable and measurable: a year should have a certain number of months, each month a particular number of days, and each day split into hours and further divided by minutes, then seconds. Einstein understood that as humans we base our experience of time on external measuring devices such as clocks, a sunrise or sunset, or a mealtime. However, Einstein's theories show that time cannot truly be fixed in any particular way; any two people who believe they are experiencing the same time really aren't. We use clocks, calendars, and other man-made instruments to possess a shared reality, but the hours nonetheless pass differently for each of us because time is perceived and internalized relative to our individual experience.

Equally differing perceptions of time are later validated (sort of) by Maese Pedro's monkey, whose "rare ability" includes responding to questions regarding the past (2.25:388). Don Quixote asks the monkey's handler whether or not his version of events in the cave was true or part of a dream, because for Don Quixote "le parecía que tenían de todo" (2.25:389): "El mono dice que parte de las cosas que vuesa merced vio, o pasó, en la dicha cueva son falsas, y parte verisímiles" (2.25:389). The monkey's answer upholds Sancho's earlier notion that more than one perspective is credible, intensifying an already-distorted sense of reality. Don Quixote's own response further underscores that reality is constantly shifting such that he will be eventually vindicated over time: "Los sucesos lo dirán, Sancho —respondió Don Quixote—; que el tiempo, descubridor de todas las cosas, no se deja ninguna que no las saque a la luz del sol, aunque esté escondida en los senos de la tierra" (2.25:389). The knight sets up a clear antithesis regarding light (the sun) and dark (the cave) in a reply laden with meaning: what occurs in the darkness has been distorted by interpretations made in the day's light, a subversion of the traditionally-accepted hierarchy of the sun as a means for illumination. Instead, the opposite is true in so far as Don Quixote claims that it will take time's passage for the sun to

shed light on what really transpired in the cave's darkness. In the end, the incident of Maese Pedro's monkey serves to further disfigure reality.

A similar judgment—or lack of judgment—is offered by the “Enchanted Head.” In this adventure, Don Antonio Moreno is ironically described as a “caballero rico y discreto, y amigo de holgarse a lo honesto y afable,” when he is actually more interested in playing elaborate jokes on his guests. On one occasion, he reveals a large bronze roman bust with a concealed tube from the bust's mouth to the head's hollow base where his nephew is hidden. The nephew responds verbally through the tube to any question, thus making the head “talk.” When Don Quixote approaches the head, his most pressing inquiry regards his experience in the cave: “Dime tú, el que respondes: ¿fue verdad o fue sueño lo que yo cuento que me pasó en la cueva de Montesinos?” (2.62:480). The poignant response, “A lo de la cueva [...] hay mucho que decir: de todo tiene” (2.62:480), reminds readers of the continued existence of multiple versions; which no one seems able to substantiate or discredit. The knight's insistence on seeking validation demonstrates his continual efforts to make those experiences real in order to “move beyond and outside himself in seeking a fixed temporal perspective from which to reaffirm his identity and self-possession” (Sieber 272). In the end, however, statements by both the monkey and the enchanted head are further examples of Cervantes's strategy of not fully informing readers about what truly happened and keeping the game going, so to speak. In fact, the narrator, quoting Cide Hamete's handwritten comments in the margin after the Montesinos adventure, is unable to confirm the veracity of the account either, leaving the final interpretation to readers: “Tú, lector, pues eres prudente, juzga lo que te pareciere, que yo no debo ni puedo más; puesto que se tiene por cierto que al tiempo de su fin y muerte dicen que se retrató della, y dijo que él había inventado” (2.24:385). Perhaps this is unsurprising: the narrator has been so vague about time that maybe readers are better positioned to judge. Put another way, readers also hold a view relative to the unfolding action. The Montesinos episode highlights the incongruence of time such that temporal structures break down and each character's perception of time is highly suspect. In short, time consciousness does not exist.

A similar discrepancy involving distance is featured in Don Quixote and Sancho's embarkation on the enchanted boat. When the two reach the Ebro river, the narrator reminds readers—for unexplained reasons—about the disparate experiences in the Cave of Montesinos, as well as about the partial validation by Maese Pedro's monkey, even though the adventure occurred some six and four chapters before, respectively: "fue y vino en lo que había visto en la cueva de Montesinos; que, puesto que el mono de maese Pedro le había dicho que parte de aquellas cosas eran verdad y parte mentira, él se atenía más a las verdaderas que a las mentirosas, bien al revés de Sancho, que todas las tenía por la misma mentira" (2.29:397). Despite being so far removed from the actual episodes, by reminding us about opposing and unresolved perceptions about time and space, Cervantes prepares readers for a similar adventure. Indeed, the Enchanted Boat episode emphasizes varying measures of distance and time that signal yet again shifting conceptions of space. For example, Don Quixote explains that his readings of chivalric tales has taught him that, to assist those in distress, it is customary for knights to travel "en menos de un abrir y cerrar de ojos [...] o por los aires o por la mar" (2.29:397), thus suggesting the notion of air transport not yet possible. Don Quixote and Sancho then board a small abandoned boat that they find along the river's bank and begin to make their way down the Ebro. As they traverse the river, Don Quixote argues they have traveled "por lo menos, setecientas o ochocientas leguas" and have probably crossed the "línea equinoccial, que divide y corta los dos contrapuestos polos en igual distancia" (2.29:397). Sancho, fully in view of the shore and within earshot of his braying ass, questions the calculations: "pues yo veo con mis mismos ojos que no nos habemos apartado de la ribera cinco varas, ni hemos decantado de donde están las alemañas dos varas, porque allí están Rocinante y el rucio en el propio lugar do los dejamos; y tomada la mira, como yo la tomo ahora, voto a tal que no nos movemos ni andamos al paso de una hormiga" (2.29:398). Don Quixote's heated reply indicates his assurance regarding the distance traveled, and likewise underscores Cervantes's impressive knowledge of early modern cartography, navigation, and instrumentation:

Haz, Sancho, la averiguación que te he dicho, y no te cures de otra, que tú no sabes qué cosa sean coluros, líneas, paralelos, zodiacos, clíticas, polos, solsticios, equinocios, planetas, signos, puntos, medidas, de que se compone la esfera celeste y terrestre; que si todas estas cosas supieras, o parte dellas, vieras claramente qué de paralelos hemos cortado, qué de signos visto y qué de imágenes hemos dejado atrás y vamos dejando ahora. Y tórnote a decir que te tientes y pesques, que yo para mí tengo que estás más limpio que un pliego de papel liso y blanco. (2.29:398)

Throughout this adventure, Don Quixote claims to be experienced with the necessary tools to prove with mathematical certainty the great distance he claims they have covered in such a short time. Sancho's humble experience as a village pig farmer, however, has not required him to know anything about astronomy or navigation, nor can he conceive the world in any form other than that which his senses tell him exists. Sancho prefers his own personal experience, which includes a tangible understanding of leagues used to measure distance in early modern Spain: "O la experiencia es falsa, o no hemos llegado adonde vuesa merced dice, ni con muchas leguas" (2.29:398). Ultimately, Sancho is guided by familiar measurements of space ("leagues") and by his accompanying sensorial experience of viewing the shoreline and his donkey. Still, Sancho's testimonial leaves open the possibility of other interpretations, since he implies that either Don Quixote is simply incorrect or that the experience is artificial ("falsa"); which is to say, otherworldly or fantastic. Indeed, this episode can be interpreted as the object of enchantment or of blurred reality in at least one respect: readers are never notified if the pair have actually crossed the river, a requisite for continuing their travels to Barcelona. It is most likely the case, of course, that the river crossing took place later, and that the narrator no longer deemed this information pertinent to the story. Nonetheless, the absence of such details after such a harrowing adventure (which ended when the millers plucked the knight and squire from the turbulent waters as their boat was ground up by the mill) invites readers to

ponder what value—if any—the narrator places on leaving out previously significant details.

Important in this episode, however, are the copious and specific references that point to Cervantes's awareness of the technological advances and scientific principles and theories of his day. In the novel, Don Quixote provides the basis for some of Cervantes's scientific background, namely Ptolemaic classical astronomy: "de treientos y sesenta grados que contiene el globo, del agua y de la tierra, según el cómputo de Ptolomeo, que fue el mayor cosmógrafo que se sabe, la mitad habremos caminado, llegando a la línea que he dicho" (2.29:398). Claudius Ptolemy's *Geography* or *Cosmography* was the most popular geographical work printed with movable type in the sixteenth century and widely available throughout Europe (Stephenson 86). Ptolemaic astronomy stressed an earth-centered universe with eight perfect crystalline spheres rotating around it. However, much of the knight's technical enumeration in this episode is drawn more directly from Johannes de Sacrobosco's *Tractatus de Sphaera* (*The Sphere of the Cosmos*), a medieval astronomical text originally written around 1230 and taught in European universities for the next four centuries (Domínguez 148-50; Flórez Miguel 59). It was required reading at the Universidad de Salamanca where it was part of the lectures of the "cátedra" of Astronomy (Flórez Miguel 59) and also used in the creation of navigational manuals and cosmographical treatise in Seville's *Casa de Contratación* (Navarro Brotons, "Astronomía" 44).⁹ Such eminence in learned circles may explain Cervantes's citation of its contents. Although Navarro Brotons maintains that "globe" and "360 degrees" would have to refer to a modern Copernican view of a heliocentric universe and a round earth ("Geografía" 18), the use of such terms in no way would preclude Ptolemaic theory. Indeed, nowhere in *Don Quixote* does Cervantes specifically mention Copernicus, but at least one modern edition of the novel states that the passage shows that Cervantes "está al margen de las innovaciones de Galileo, Copérnico y demás físicos renacentistas" (Sevilla and Rey Hazas 761, n10). Moreover,

9 Sacrobosco (John of Hollywood) was an Irish scholar and monk at the University of Paris. See Domínguez for an analysis of Cervantes's familiarity with Sacrobosco's treatise in this episode.

Sancho's subsequent mangling of Don Quixote's astronomical discussion could be viewed as a reference to the entire early modern debate regarding Copernicus's radical heliocentric views: "Por Dios —dijo Sancho—, que vuesa merced me trae por testigo de lo que dice a una gentil persona, puto y gafo, con la añadidura de meón, o meo, o no sé cómo. Rióse don Quijote de la interpretación que Sancho había dado al nombre y al cómputo y cuenta del cosmógrafo Ptolomeo" (2.29:398). The deformation of "Ptolomeo" into "meón o meo," "cosmógrafo" into "gafo," and "cómputo" into "puto," aptly expresses the on-going controversial debates. Cervantes knew Ptolemy's work and he was no doubt aware of the Inquisition's widely published charges against Galileo for defending Copernicus's heliocentric universe.

Regardless of whether Cervantes knew something about Copernican astronomy, prevailing research by Galileo had already linked time and distance mathematically. Aboard the boat, readers are told of disparate perceptions that include theoretically possible movements through space and time (estimated by Don Quixote) contrasted with a calculation of distance understood only in terms of clock time and commonly measured distance (estimated by Sancho). Indeed, for ordinary citizens, time and space were constructs that only could be comprehended comfortably through the execution of several measuring devices such as the sundial, the mechanical clock, or the astrolabe. In Cervantes's time the sundial was wildly inaccurate, and the mechanical clock was quite large, prohibitively expensive, and therefore relegated to church steeples or public plazas.¹⁰ Conversely, the astrolabe had been developed to such a degree that people could easily carry it on their person. The problem in *Don Quixote*, however, is that neither the knight nor

10 Up to the seventeenth century, time often was measured by observing the motion of the sun, moon, and stars, or by using a shadow-casting object such as a tree or a post. One of the most famous of these objects was the Egyptian obelisk (brought to Europe by the Romans). As De Armas points out, the obelisk erected in Rome's Campus Martius was one of the most famous and was likely known to Cervantes (10-11). De Armas later notes that Sancho makes reference to the rumour that this obelisk's tip held the ashes of Julius Caesar (344). Eventually, the sundial supplanted the use of such objects. With respect to the astrolabe, when it is properly aligned, it depicts the Earth and the heavens flattened together into a plane providing a graphic image for telling time. Hence, direction, time, angles, and the position of the celestial bodies could all be calculated more or less accurately.

his squire possess any of these, although Don Quixote believes an astrolabe would vindicate his observations:

si yo tuviera aquí un astrolabio con que tomar la altura del polo, yo te dijera las que hemos caminado; aunque, o yo sé poco, o ya hemos pasado o pasaremos presto, por la línea equinoccial, que divide y corta los dos contrapuestos polos en igual distancia (2.29:397-98).

Hence, Don Quixote knows that the astrolabe provided such concise coordinates that distance and time could be accurately measured. Similarly, such an instrument might be proof enough to convince Sancho of the distance traveled, thereby seemingly eliminating the shifting notion of space and time's constant change.

Early astronomers such as Copernicus, Tycho Brahe, Kepler and Galileo knew that time and space were malleable constructs. These scientists also realized that it was difficult, even counterintuitive, for everyday man to understand them in any fashion other than through accepted calculation devices. The results of their scientific research during Cervantes's time clearly gave birth to the European social idea that travel through time and space was theoretically possible as well as provide clues for understanding Don Quixote and Sancho's differing perceptions regarding their travel through space. According to Einstein, time and space are fixed to one another such that the experience of either is relative to the speed with which the human race moves. More specifically, Einstein's "time dilation" illustrates that the closer one comes to traveling at the speed of light—the only fixed measurement that science accepts—the more time would slow down for that person in comparison to someone who was not moving at all. Then, theoretically, at the speed of light time would stop all together, and if one could exceed the speed of light, time would actually move backwards.¹¹ Using

¹¹ Einstein's *relativity factor* demonstrates that approaching the speed of light time slows down: clocks slow, a space traveler is a little younger, and she or he will have experienced less. Einstein's research shows that time travel is theoretically possible, giving life to science "fiction" and yielding the extraordinary travels in H.G. Wells and other writers. NASA has proved that astronauts returning to earth having aged fractionally less than those who remained on the

this as an explanation for the discrepancy involving Sancho and Don Quixote's perceptions of distance would not require a literal interpretation. It is doubtfully the case that Don Quixote was somehow physically moving more quickly through time and thus covering a greater distance than Sancho. Rather, Cervantes is showing us one aspect of the mutability of time and space, (un)wittingly explaining early theories of relativity which were in circulation throughout Europe.

Speed is central to the discrepant viewpoints that arise in the adventure of Clavileño. In this episode, Sancho and Don Quixote are made the butt of an elaborate joke orchestrated by the Duke and Duchess. Blindfolded, they mount the wooden horse and "fly" 3,227 leagues (note the exactness of the distance) to the heavens to battle the giant Malambruno. They are told that if they successfully defeat him, the Dueña Dolorida and her damsels will lose their beards. From the moment Clavileño is brought out, the wooden animal is described in technological or scientific terms. In fact, Don Quixote calls it a "machine" as if to underscore its otherworldliness: "Suba sobre esta máquina el que tuviere ánimo para ello" (2.41:423). Moreover, the entire episode is grounded by a lengthy and detailed discussions in the preceding chapter on the prominent aerial ascents of famous flying horses from legends and medieval romances. It is therefore clear that Don Quixote and Sancho *believe* they will be flying to another world from which they may not soon return, a proposition acknowledged by the knight: "Ya vees, Sancho hermano, el largo viaje que nos espera, y que sabe Dios cuándo volveremos dél, ni la comodidad y espacio que nos darán los negocios" (2.41:424). Finally mounted, they are made to believe they are flying through the air at great speeds and well beyond the immediate reach of the palace. Just as in the episode of the enchanted boat, Sancho wonders how he can still hear the spectators if their flight has taken them so far away. Don Quixote's reply suggests just how extraordinary this journey is: "No repares en eso, Sancho, que como estas cosas y estas volaterías van fuera de los cursos ordinarios, de mil leguas verás y oirás lo que quisieres" (2.41:425). Such a statement

earth; likewise, incredibly-accurate atomic clocks ticked slower while gone, yielding a loss of fractions of seconds.

again underscores the incredulity of the entire affair while simultaneously advancing the notion that such a theoretical journey lays ahead.

Readers know, of course, that the two have not left the ground, as this is what the narrator tells us, which is further proven by the actions of the spectators. How could it be that knight and squire believe otherwise? As Einstein proved in his *principle of equivalence*, acceleration and gravitation are equivalent in so far as it is impossible to know if motion is taking place absent a definitive comparative reference point; and, without said frame of reference, it is equally difficult to measure the distance traveled or the time transpired. Einstein proved what Galileo had theorized in his analogy of a ship sailing on smooth water unshaken by the jolting seas: if a passenger were stationary in the ship's dark hold unable to view the seas or the shore passing by, there is no visible reference point to help gauge whether or not motion is taking place. From this example is derived "Galilean invariance" or "Galilean relativity," which affirms that the most fundamental laws of physics are the same in all inertial states. Galileo first described the principle in the *Dialogue Concerning the Two Chief World Systems* using the example of the ship and giving birth to the widespread scientific use of the term "relativity." In today's world a similar experience occurs when seated inside an airplane unable to see outside: until the craft encounters a rough patch in the runway—or in the air—passengers normally cannot discern movement. Instead, we take for granted such movement is occurring, or will occur. In some ways, this could help explain Don Quixote's descent into the cave where the cavern's blackness makes it impossible to gauge distance or correctly assess time's passage, just as Plato asserted. A striking similarity occurs as Don Quixote and Sancho are blindfolded atop Clavileño. Absent a visible marker, the pair cannot discern if they are actually moving or not, until the palace servants put to use large chimney bellows that simulate blowing air. For the pair, it is precisely the gusts that confirm their movement while it is their common experience about how much time passed in the interim that provides the reference for the distance that they now should have traversed. Both knight and squire believe that their trajectory has taken

them to the second region of the heavens where they will soon reach the region of fire and perhaps be burned:

ya debemos de llegar a la segunda región del aire, adonde se engendra el granizo, las nieves; los truenos, los relámpagos y los rayos se engendran en la tercera región, y si es que desta manera vamos subiendo, presto daremos en la región del fuego, y no sé yo cómo templar esta clavija para que no subamos donde nos abrasemos. (2.41:425)

Sancho, too, has sensed movement and, spurred on by Don Quixote's version of events, complains that his beard is being singed. The adventure comes to an end when the servants light the fireworks packed in Clavileño's tale. The powerful explosion propels the pegged horse violently through the air with such a loud noise that the passengers are thrown to the ground, finalizing the adventure but also physically confirming for the two the flight they had just taken.

Up to this point, the knight and his squire have seemingly experienced the same events. When queried about the adventure, however, Sancho's description is diametrically opposed to Don Quixote's. He tells the Duchess that he realized they were flying near the region of fire, but that he wanted to see for himself. Recalling that Sancho's lived experience determined his perception of the events in the episode of the enchanted boat, a similar process takes place after Clavileño: "por allí miré hacia la tierra, y parecióme que toda ella no era mayor que un grano de mostaza, y los hombres que andaban sobre ella, poco mayores que avellanas; porque se vea cuán altos debíamos de ir entonces" (2.41:426). The difference, of course, is that Sancho could not have seen any of this because nowhere in the text does anyone (narrators, Don Quixote, or spectators) note that he has removed the blindfold, nor is there any mention that the two have ever left the ground.

Or did they? Textual cues tell us—if we are to believe the narrator—that Clavileño not only cannot fly but that it remained fixed to the ground throughout the adventure, until the fireworks jolted the horse through the air. Therefore, either Sancho has invented an elabo-

rate story, or we are meant to believe him. In fact, since the beginning of part one, readers have been trained to trust Sancho's practical version of events as he seems much more reliable and sensible than Don Quixote. We must remember, however, that Sancho really has not provided a trustworthy point of view on several occasions; such occasions include his willingness to concede the existence of Mambrino's helmet if allowed to keep the spoils of the battle with the barber. In the Clavileño episode, Sancho claims to have been a "palmo y medio" (2.41:426) away from the heavens where he played among the "siete cabrillas" for "casi tres cuartos de hora" (2.41:426).¹² The tables have turned; just as Don Quixote claims to have spent three days and nights in the cave, Sancho declares that he has taken flight and visited the stars. Yet again we see how Sancho's conceptualization of time's passage, regardless of the legitimacy of his story, is quite different from the brief instance readers are told the two actually spent aboard Clavileño. Sancho's testimony provides a humorous take on the cosmography of the period, and his story seems quite fabricated, but it is not much more exaggerated than Don Quixote's, who provides still another version of the events:

Como todas estas cosas y estos tales sucesos van fuera del orden natural, no es mucho que Sancho diga lo que dice. De mí sé decir que ni me descubrí por alto ni por bajo, ni vi el cielo ni la tierra, ni la mar ni las arenas. Bien es verdad que sentí que pasaba por la región del aire, y aun que tocaba a la del fuego; pero que pasásemos de allí, no lo puedo creer, pues, estando la región del fuego entre el cielo de la luna y la última región del aire, no podíamos llegar al cielo donde están las siete cabrillas que Sancho dice, sin abrasarnos; y pues no nos asuramos, o Sancho miente, o Sancho sueña. (2.41:426)

12 In Sancho's turn of phrase, the "siete cabrillas" refers to Pleiades, the "seven sisters," seven of the most brilliant stars in the Taurus constellation discernible to the naked eye at night. The seven have different meanings in different cultures including Greek mythology, Norse mythology, Celtic mythology, and Eastern and Western folklore. Around 1609 Galileo found another forty stars invisible to the naked eye. He described the entire cluster through a pencil drawing in his *Starry Messenger*.

If we consider that the narrator provides us with commentary and context, the palace spectators including the Duke and Duchess (who are also participants) witness the events, and Sancho and Don Quixote provide two supplementary, but contrary, versions, one could conclude that no account is acceptable or, alternately, all of them are valid. The conflicting evidence leads to disbelief, and the final word—which the narrator does not question—is claimed by Don Quixote, who suggests that if Sancho can believe what occurred in the Cave of Montesinos, the knight will do the same regarding Clavileño: “Sancho, pues vos queréis que se os crea lo que habéis visto en el cielo, yo quiero que vos me creáis a mí lo que vi en la cueva de Montesinos; y no os digo más” (2.41:427). As indicated, Sancho’s readiness to accept a negotiated resolution accentuates how untrustworthy he really is. More importantly, the truce binds the two for the rest of the novel, making the fictional real and the real fictional. As B.W. Ife points out, the entire adventure teaches us about the traditional and theoretical issues concerning plausibility in fiction: “What we have here is not just a satire on aerial ascent, but a satire on the kinds of arguments that might be invoked to explain away an aerial ascent in fiction” (67). As Ife then makes clear, simply stating that aerial travel is impossible is not sufficient to disprove it. Instead, Cervantes is perhaps telling us that behind the popular bewilderment regarding air travel there exist sound scientific principles governing motion through space.

The episode also reminds us about the pliability of reality. It does not seem to me fortuitous that the three episodes analyzed above take place within a span of only nineteen chapters with intervening commentary on the adventures in other chapters. Nor does it seem chance that each examines one of the three necessary scientific components of relativity. However, this essay is not the first to propose that Cervantes was either familiar with the concept of relativity (consciously or not) or that relativity can be used to explain differing perceptions regarding space, time, and motion in the novel.

In 1969, the Mexican artist Andrés Salgó painted “The Travel of the Century” (see figure 1), which depicts Don Quixote traveling through

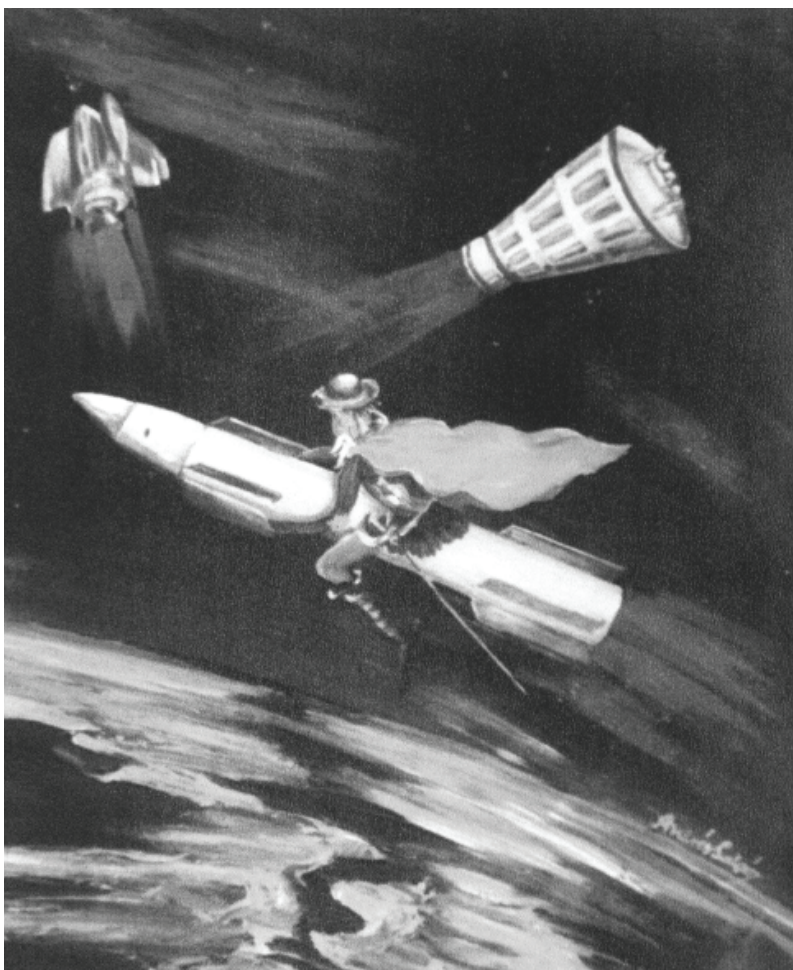


Fig. 1: Andrés Salgó's *The Travel of the Century*. Image courtesy of the Eduardo Urbina Cervantes Collection, Texas A&M University Libraries.

space.¹³ The canvas, perhaps also drawing on the *Clavileño* episode, shows the fully armed knight donning Mambrino's helmet, clutching a rocket, and soaring over the earth, past a satellite and a spaceship. Like Cavanillas Ávila, whose article suggests that the scientific principles so necessary for space travel have a reference in Cervantes's nar-

¹³ The painting can be found in *Works by Miguel de Cervantes Saavedra in the Library of Congress* and Andrés Salgó's *Don Quijote en el siglo XX/Don Quixote in the XXth Century*.

rative, Salgó artistically renders Don Quixote's imaginary flight as a precursor to twentieth-century space travel. We need only wait until later in 2011 to see if Don Quixote and Sancho's aerial ascent really happened: the European Space Agency (ESA) will launch its much-anticipated "Don Quixote" space project featuring two probes, *Hidalgo* and *Sancho*, to investigate the impact of asteroids. As ESA's *Neo Space Mission Preparation* web site states, the two spacecraft will be "launched in separate interplanetary trajectories," echoing the literary protagonists' often-detached viewpoints in the novel. In fact, the similarities do not end there. *Hidalgo* will be set on a deliberate course so as to directly strike an asteroid while *Sancho* "will retreat to a safe distance to observe the impact without taking unnecessary risk (with an attitude appropriate to its name)." In their development and naming of the orbiters it seems that ESA understood enough about Cervantes's novel to appropriate from it some of salient traits of the main characters. The ESA project ironically may be the one true opportunity for the literary characters to realize space travel, albeit under decidedly different circumstances.

Considering the advances in physics to the present, the notion of hurling oneself over great distances and at incredible speeds has moved beyond science fiction. Indeed, since the 1960s, space travel itself has become a fairly common occurrence that we nearly take for granted. There is no way of knowing for sure what Cervantes thought about the great scientific advances of his own day, but the many scientific references in his works suggest he was at least conversant about what was transpiring, and understood how such discoveries were shaping the manner in which people viewed their own world. Upon first glance, the impossibility of covering immense distances aboard the enchanted boat, reaching high speeds upon *Clavileño*, or experiencing time's fleeting passage in the Cave of Montesinos seem to be nothing more than the product of Don Quixote's or Sancho's imagination. As such, the three adventures defy accepted and commonly-understood notions of space, motion, and time. In truth, however, early studies regarding relativity provided plausible scientific explanations for conceiving and comprehending such transient concepts—even in the mythic time of

literature—and likewise clarify how two characters experiencing the same events can reach wildly different conclusions. Indeed, as readers it is easier to embrace the most practical of these perspectives, but we must not ignore the scientific context of Cervantes's day: that such disparities with respect to time, space, and motion occur so often in part two suggests that the novelist was aware of contemporaneous science even if he relayed that knowledge in an often funny or irreverent way, yet still firmly grounded in sound scientific principles.

gasta@iastate.edu
IOWA STATE UNIVERSITY

Works Cited

- Allen, John J. "Don Quixote and the Origins of the Novel." *Cervantes and the Renaissance*. Ed. Michael McGaha. Easton, PA: Juan de la Cuesta, 1980. 125-40.
- Avallé-Arce, Juan Bautista. "Cervantes and the Renaissance." *Cervantes and the Renaissance*. Ed. Michael McGaha. Easton, PA: Juan de la Cuesta, 1980. 1-10.
- Becedas González, Margarita, Cirilo Flórez, and María Jesús Mancho Duque, eds. *La ciencia y la técnica en la época de Cervantes*. Salamanca: U de Salamanca P, 2005.
- Biagioli, Mario. *Galileo, Courtier: The Practice of Science in the Culture of Absolutism*. Chicago: U of Chicago P, 1994.
- Castellano, David J. "The Reception of Copernicanism in Spain and Italy before 1800." MA Thesis. Boston University, 2004. Web. 1 Sept. 2010.
- Castro, Américo. *El pensamiento de Cervantes*. Madrid: Hernando, 1925.
- . *Hacia Cervantes*. 3rd ed. Madrid: Taurus, 1967.
- Cavanillas Ávila, Luis. "Don Quijote y Sancho: los primeros cosmonautas del mundo." *La Nueva Democracia* 42.3 (1962): 88-97.
- Cervantes Saavedra, Miguel de. *Obras completas*. Ed. Florencio Sevilla. Madrid: Castalia, 1999.
- . *El ingenioso Don Quijote de la Mancha*. Ed. Florencio Sevilla and Antonio Rey Hazas. Madrid: Centro de estudios cervantinos, 1994.
- Dale, George Irving. "The Chronology of *Don Quixote*, Part I." *Hispania* 21.2 (1938): 179-86.
- Damour, Thibault. "Einstein 1905-1955: His Approach to Physics." *Einstein, 1905-2005: Poincaré Seminar 2005*. Eds. Thibault Damour, Olivier Darrigol, Bertrand Duplantier and Vincent Rivasseu. Basel, Switzerland: Birkhäuser Verlag, 2006. 151-82.

- De Armas, Frederick. "Sancho as a Thief of Time and Art: Ovid's *Fasti* and Cervantes' *Don Quixote* 2." *Renaissance Quarterly* 61.1 (2008): 1-25.
- Domínguez, Julia. "Caluros, líneas, paralelos y zodíacos: la cosmografía en *el Quijote*." *Cervantes* 29.2 (2009): 139-57.
- Durán, Manuel. "Perspectivismo en un capítulo del *Quijote*." *Hispania* 39. 2 (1956): 145-48.
- Earle, Peter G. "In and Out of Time." *Hispanic Review* 71.1 (2003): 1-13.
- Esteven Piñeiro, Manuel. "La ciencia de las estrellas." *La ciencia y el Quijote*. Dir. José Manuel Sánchez Ron. Barcelona: Crítica, 2006. 23-35.
- Fernández Álvarez, Manuel. *España y los españoles en el tiempo moderno*. Salamanca: U de Salamanca P, 1979.
- Flórez Miguel, Cirilo. "Las artes mecánicas en la época de Cervantes." *La ciencia y la técnica en la época de Cervantes*. Salamanca: Ediciones de la Universidad de Salamanca, 2005. 51-60.
- Friedman, Edward H. "Past Perfect: the Battle Against Time in *Don Quixote*." *Studies in Honor of Denah Lida*. Ed. Mary G. Berg and L. A. Gyurko. Potomac, MD: Scripta Humanistica, 2005. 132-43.
- Gómez Galán, Antonio. "El día y la noche en *el Quijote*." *Arbor* 49.185 (1961): 33-43.
- Grinberg, León and Juan Francisco Rodríguez. "The Influences of Cervantes on the Future Creator of Psychoanalysis." *International Journal of Psycho-Analysis* 65.1 (1984): 147-68.
- Halsmann, Philippe. "Einstein." *The New York Review of Books*. 6.9. 26 May 1966. Web.
- Ibérico Rodríguez, Mariano. "El Retablo de Maese Pedro. Estudio sobre el sentimiento del tiempo en *Don Quijote*." *Mercurio Peruano* 36.1 (1955): 79-97.
- Ife, B. W. "Air Travel in Cervantes." *Cervantes: Essays in Memory of E. C. Riley on the Quatercentenary of DON QUIJOTE*. Ed. Jeremy Robbins and Edwin Williamson. London: Routledge, 2005. 61-72.
- Istituto e Museo di Storia della Scienza, Florence. *Machina Mundi: Images and Measures of the Cosmos from Copernicus to Newton*. Florence: Edizioni Polistampa, 2004.
- Johnson, Carroll. *Cervantes and the Material World*. Urbana: U of Illinois P, 2000.
- Kamen, Henry. *Imagining Spain: Historical Myth and National Identity*. New Haven: Yale UP, 2008.
- Langone, John. *The Mystery of Time: Humanity's Quest for Order and Measure*. Washington, D.C.: National Geographic Society, 2000.
- Magassy Dorn, Georgette, ed. *Works by Miguel de Cervantes Saavedra in the Library of Congress*. Compiled by Reynaldo Aguirre. Washington, DC: Library of Congress, 1994.
- Moring, Gary F. *The Complete Idiot's Guide to Understanding Einstein*. New York: Penguin, 2004.

- Murillo, L. A. *The Golden Dial: Temporal Configuration in DON QUIJOTE*. Oxford: Dolphin, 1975.
- Navarro Brotons, Víctor. "Astronomía y cosmología en la España del siglo XVI." *Actes de les II Trobades d'Història de la Ciència i de la Tècnica* (1993): 39-52.
- . "La geografía y la cosmografía en la época de *El Quijote*." *La ciencia y El Quijote*. Dir. José Manuel Sánchez Ron. Barcelona: Crítica, 2005. 13-21.
- . "Galileo y España." *Largo campo di filosofare*. Eds. José Montesinos and Carlos Solís Santos. La Orotava, Spain: Fundación Canaria Orotava de Historia de la Ciencia, 2001. 809-30.
- Neo Space Mission Preparation*. European Space Agency (EAS). Web. 1 Aug. 2010
- Parr, James. *"Don Quixote": An Anatomy of Subversive Discourse*. Newark: Juan de la Cuesta, 1988.
- Pinet, Simone. "Theatrum mundi: Cervantes, el teatro y la cartografía." *Theatralia*. 5.1 (2003): 133-42.
- Reston, James. *Galileo: A Life*. New York: Harper Collins, 2005.
- Riley, E. C. *Cervantes's Theory of the Novel*. Oxford: Oxford UP, 1962.
- Rodríguez-San Pedro Bezares, Luis E. and José Luis Sánchez Lora. *Los siglos XVI-SVII: Cultura y vida cotidiana. Historia de España 3er milenio*. Madrid: Editorial Síntesis, 2000.
- Rueda Contreras, Pedro. *Los valores religioso-filosóficos de El Quijote*. Valladolid: Miraflores, 1959.
- Salgó, Andrés and Rubén Salazar. *Don Quijote en el siglo XXI Don Quixote in the XXth Century*. Mexico City: Editorial de los Estados, 1969.
- Sánchez Ron, José Manuel. "Ciencia, técnica, Cervantes y *El Quijote*." *La ciencia y El Quijote*. Ed. José Manuel Sánchez Ron. Barcelona: Crítica, 2005. 7-12.
- , ed. *La ciencia y EL QUIJOTE*. Barcelona: Crítica, 2005.
- Sharratt, Michael. *Galileo: Decisive Innovator*. Cambridge: Cambridge UP, 1994.
- Shea, William R. "Galileo the Copernican." *Largo campo di filosofare*. Eds. José Montesinos and Carlos Solís Santos. La Orotava, Spain: Canaria Orotava de Historia de la Ciencia, 2001. 41-59.
- Sieber, Harry. "Literary Time in the 'Cueva de Montesinos'." *MLN* 86.2 (1971): 268-73.
- Sonnert, Gerhard. *Einstein and Culture*. New York: Humanity Books, 2005.
- Spitzer, Leo. "Perspectivismo lingüístico en *El Quijote*." *Lingüística e historia literaria*. Madrid: Gredos, 1955.
- Stephenson, Richard W. "Map of the World." 1492: An Ongoing Voyage. Ed. John R. Hebert. Washington, D.C.: Library of Congress, 1992. 86-87.